

Progress at KVI

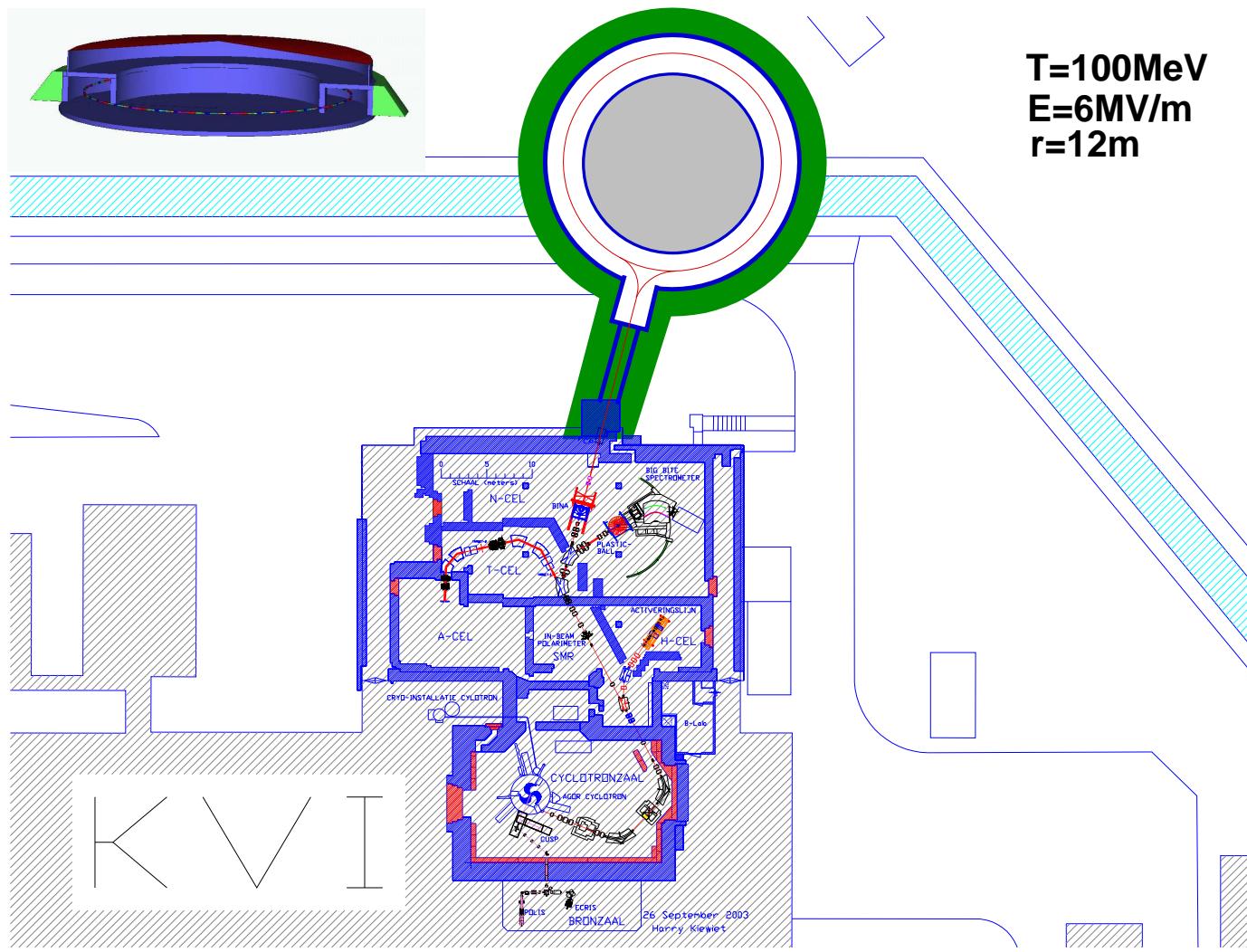
Gerco Onderwater

KVI / RUG

Overview

- An zeroth order design for KVI
- Cost estimate
- Some beam simulations
- Polarimeter issues

A draft design

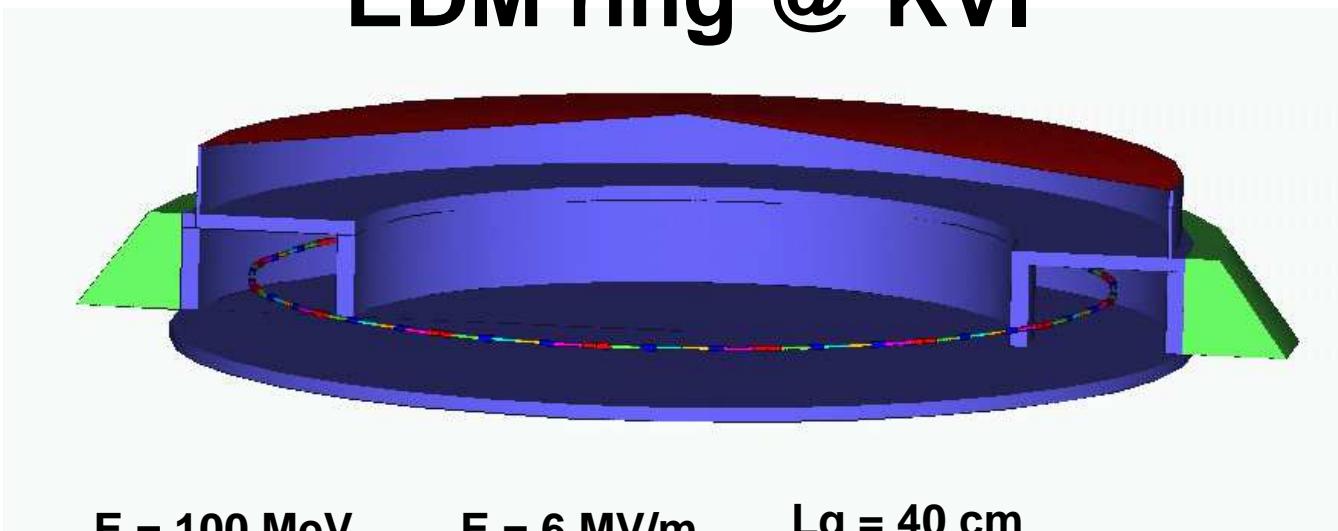


A draft design



A draft design

EDM ring @ KVI



$$E = 100 \text{ MeV}$$

$$p = 625 \text{ MeV}/c$$

$$E = 6 \text{ MV/m}$$

$$B = 0.44 \text{ T}$$

$$R = 12 \text{ m}$$

$$Lq = 40 \text{ cm}$$

$$Ld = 150 \text{ cm}$$

Cost Estimate

Conventional

transport tunnel @ 50cm, 3×3×20m		70k
transition region @ 50cm, 10×10×3m		113k
piling @ 1/m ² , 25×0.3×0.3	170×1k	170k
reinforced floor @ 50cm, ø14m and concrete walls @ 30cm, 3m	136 m ³	60k
removable ceiling @ 30cm, 4m		160k
'teepee' steel		100k
crane @ 14m / 6tons		100k
dirt wall		40k
re-routing canal		40k
entrance/exit ramp/road		40k
cooling tower + infrastruct.		350k
investment conventional		1243k

Cost Estimate

Technical			
<i>transport</i>			420k
10 quads	$10 \times (12k+4k)$	160k	
2 dipoles @ 30°	$2 \times (50k+30k)$	160k	
vacuum @ 20m	$20 \times 5k$	100k	
<i>transition</i>			2574k
switch magnet @ ±15°	50k+30k	80k	
bend magnets @ 30°	$4 \times (50k+30k)$	320k	
septum magnets @ 3kW	$2 \times (30k+7k)$	74k	
injection kickers (from AP)	$2 \times 1000k$	2000k	
vacuum @ 2×10m	$20 \times 5k$	100k	
<i>ring (16-fold symmetry)</i>			3499k
32 dipoles @ 10×10×86cm, 10kW, 1500kg	$32 \times (35k+23k)$	1856k	
32 quads @ φ10cm, 40cm, 1.5kW, 250kg	$32 \times (10k+3.5k)$	432k	
16 quads @ φ10cm, 80cm, 3kW, 500kg	$16 \times (20k+7.0k)$	432k	
vacuum @ 77m, 'bakeable' 100°	$77 \times 10k$	770k	
Investment technical			6493k

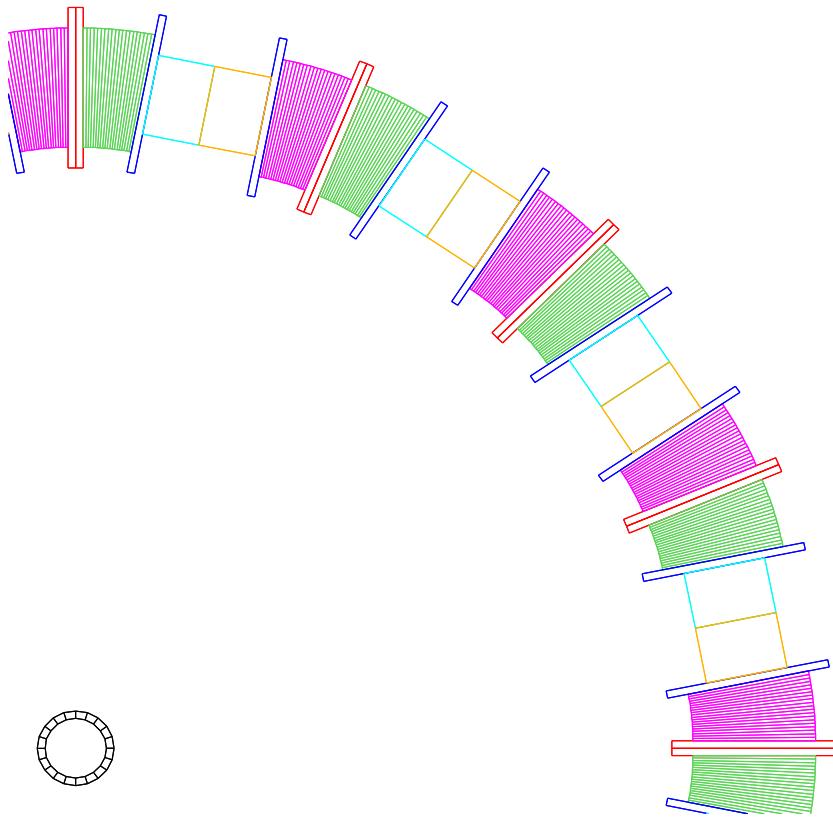
Cost Estimate

Investment conventional	1243k
Investment technical	6493k
Total investment	7736k
Labor @ 75%	5802k
EDIA @ 15%	2031k
Contingency @ 25%	3892k
TOTAL	19460k

Operation

Running @ 250days (incl. power, manpower, support, etc.)	250×24×600	3600k
TOTAL COST	23060k	

Some beam simulations

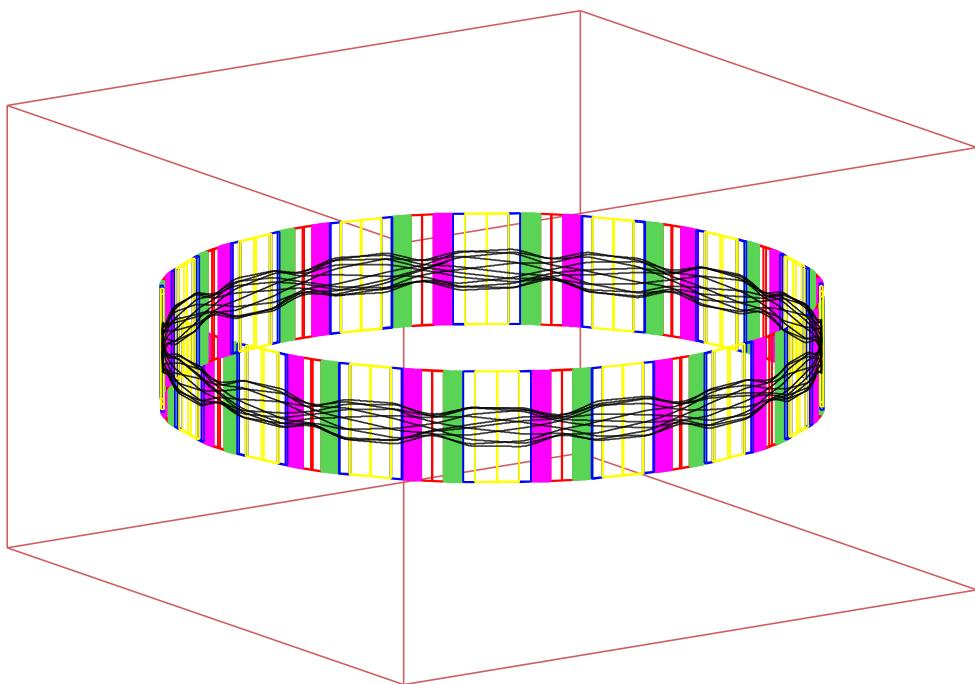


$$c\mathcal{B} = \frac{m^2 - ap^2}{ap\sqrt{m^2 + p^2}} \mathcal{E}$$

$$R = \frac{ap^2\sqrt{p^2 + m^2}}{\mathcal{E} [(1 - a)m^2 - 2ap^2]}$$

$$R_{tot} \simeq R_{bend} + \frac{2L_q + L_d}{\pi} n$$

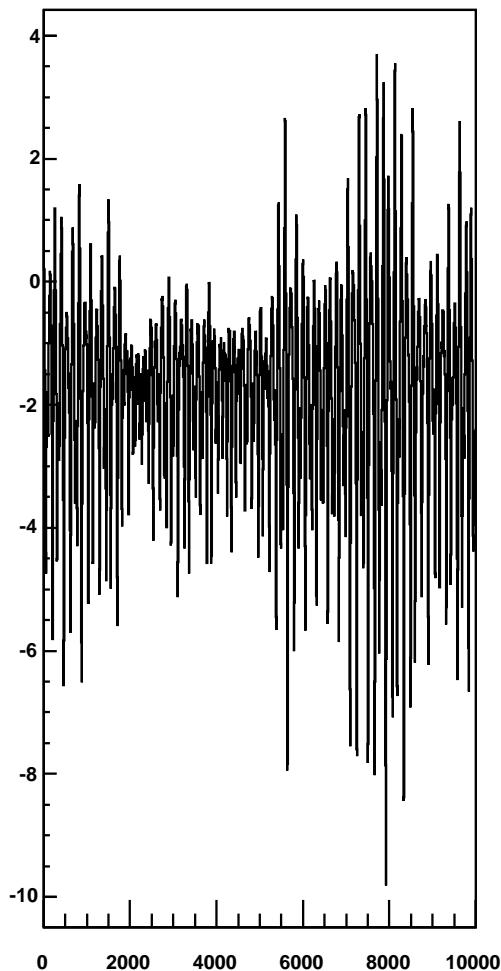
Some beam simulations



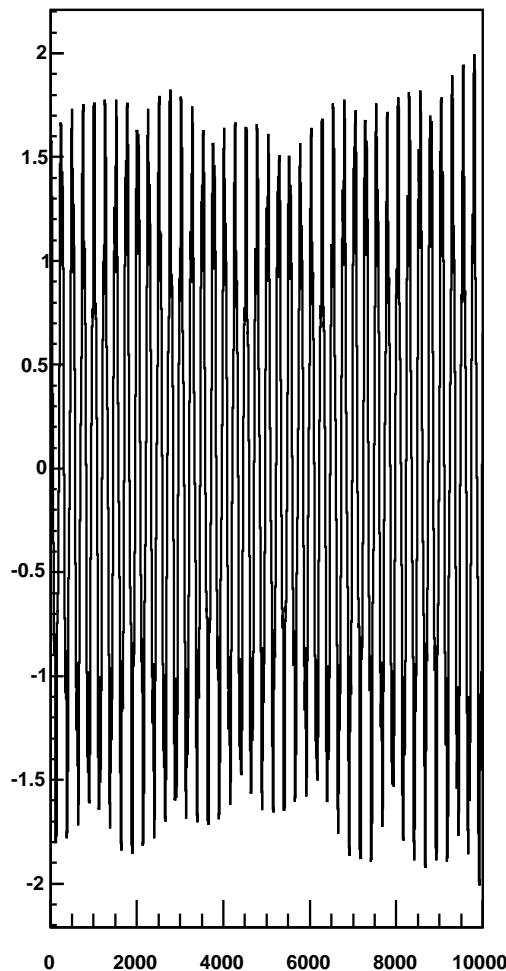
momentum	550.00 MeV/c
kinetic energy	80.03 MeV
electric field	-6.00 MV/m
magnetic field	4868.02 Gauss
bending radius	341.74 cm
nr. sectors	16
length dipole	67.10 cm
length quad	40.00 cm
length drift	75.00 cm
total radius	1132.30 cm
circumference	3553.59 cm
quad gradient	253 Gauss/cm
ΔR	1 cm
Δz	1 cm
p_R/p	0
p_z/p	0
Δp	0 MeV/c

Some beam simulations

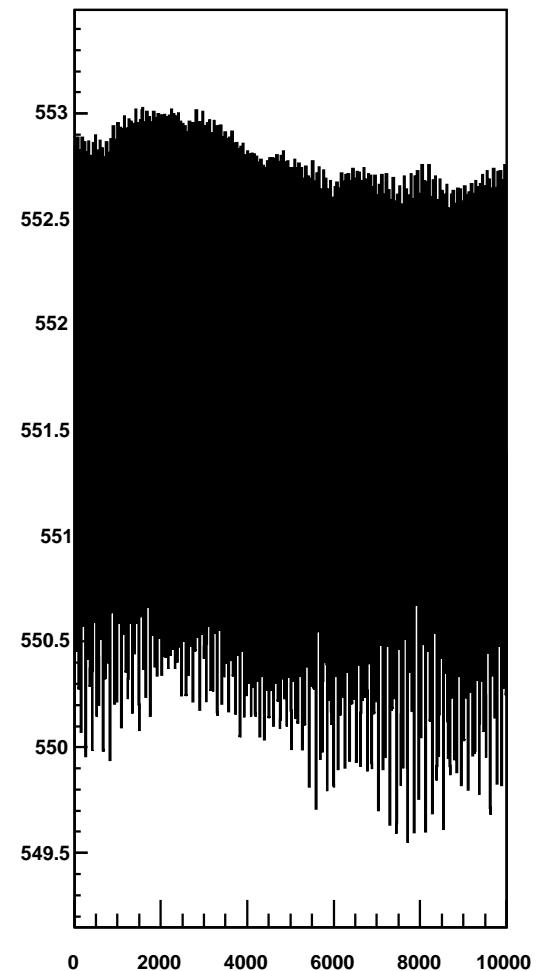
ghdr



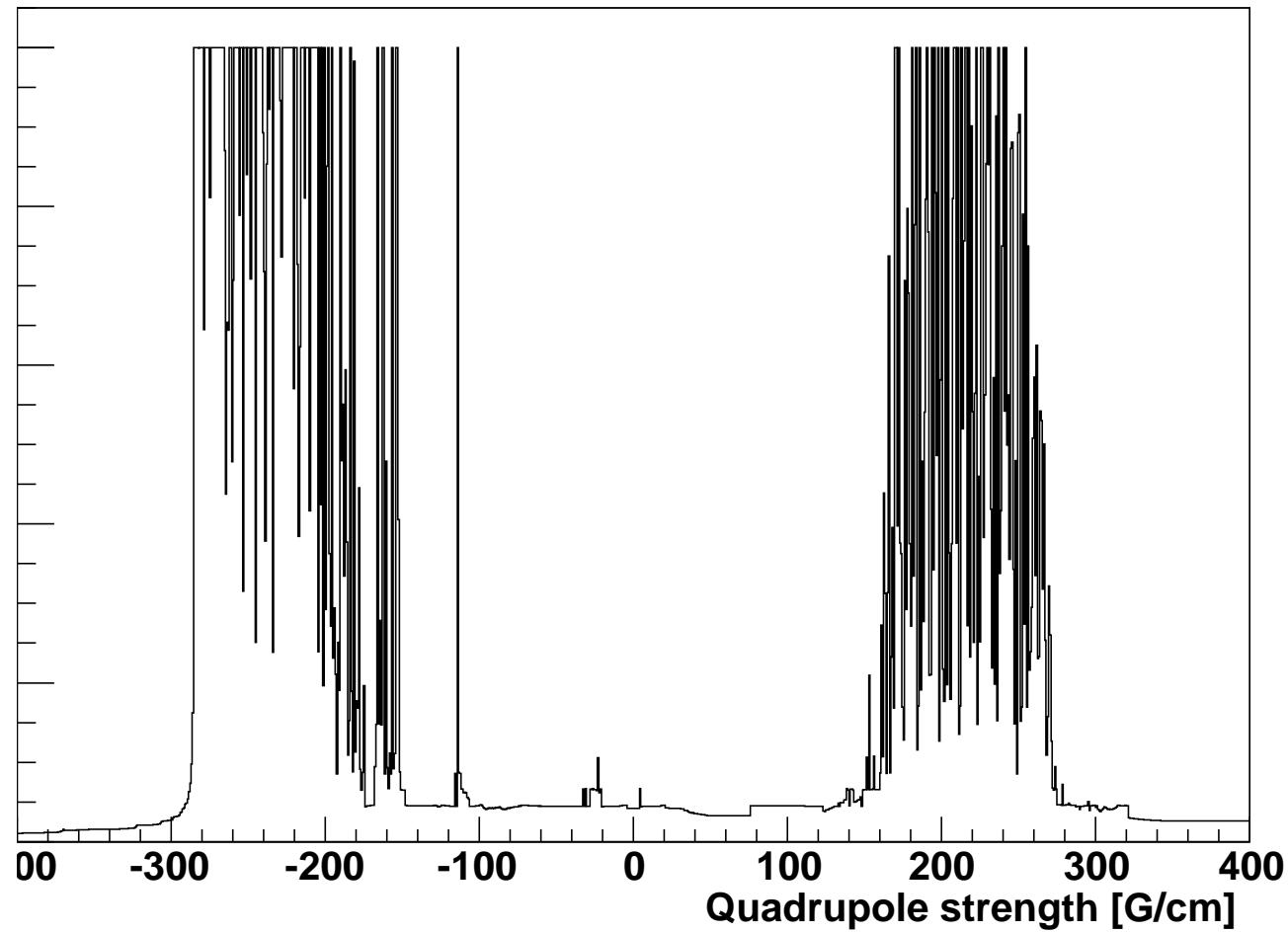
ghz

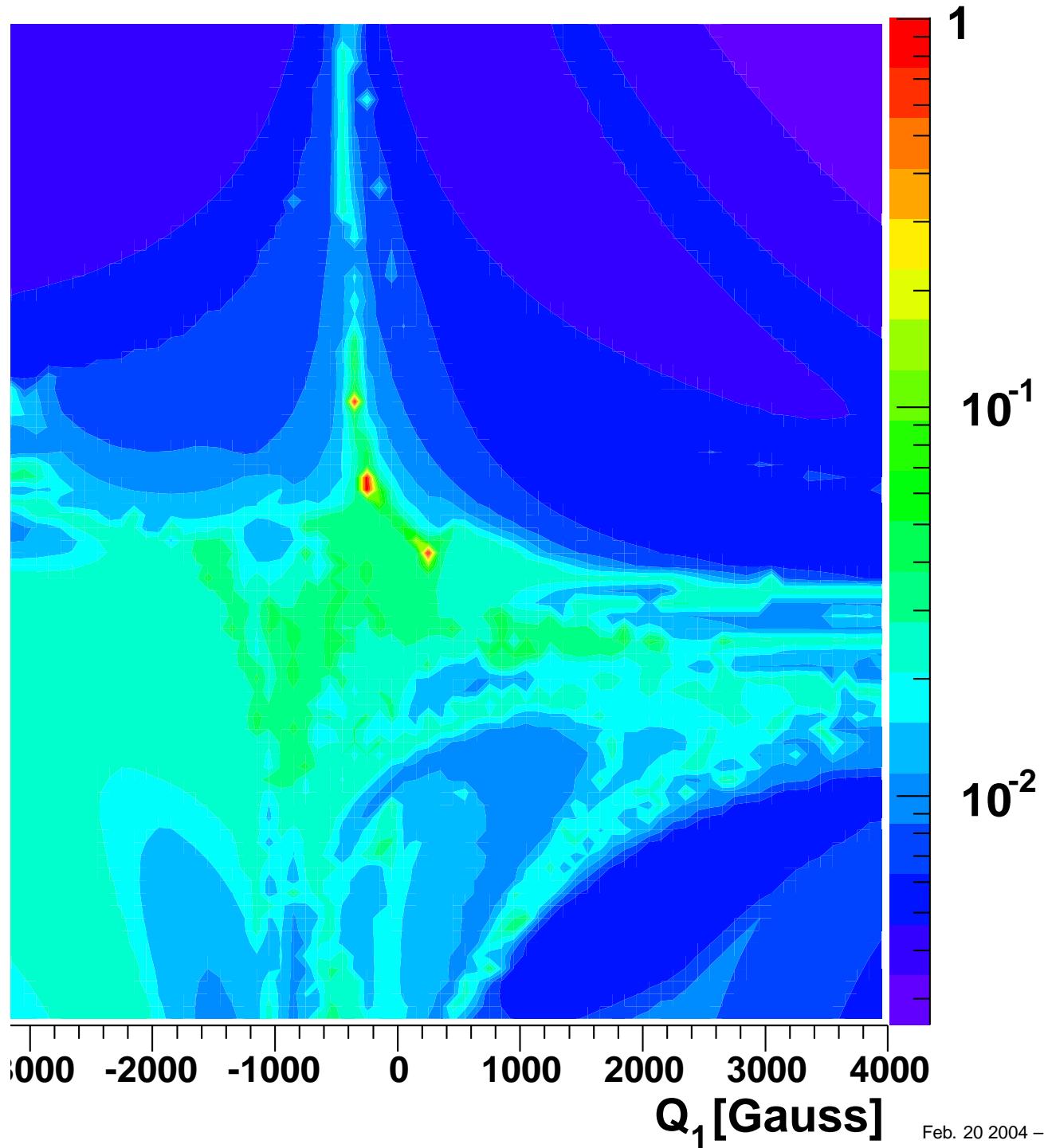


ghE



Some beam simulations



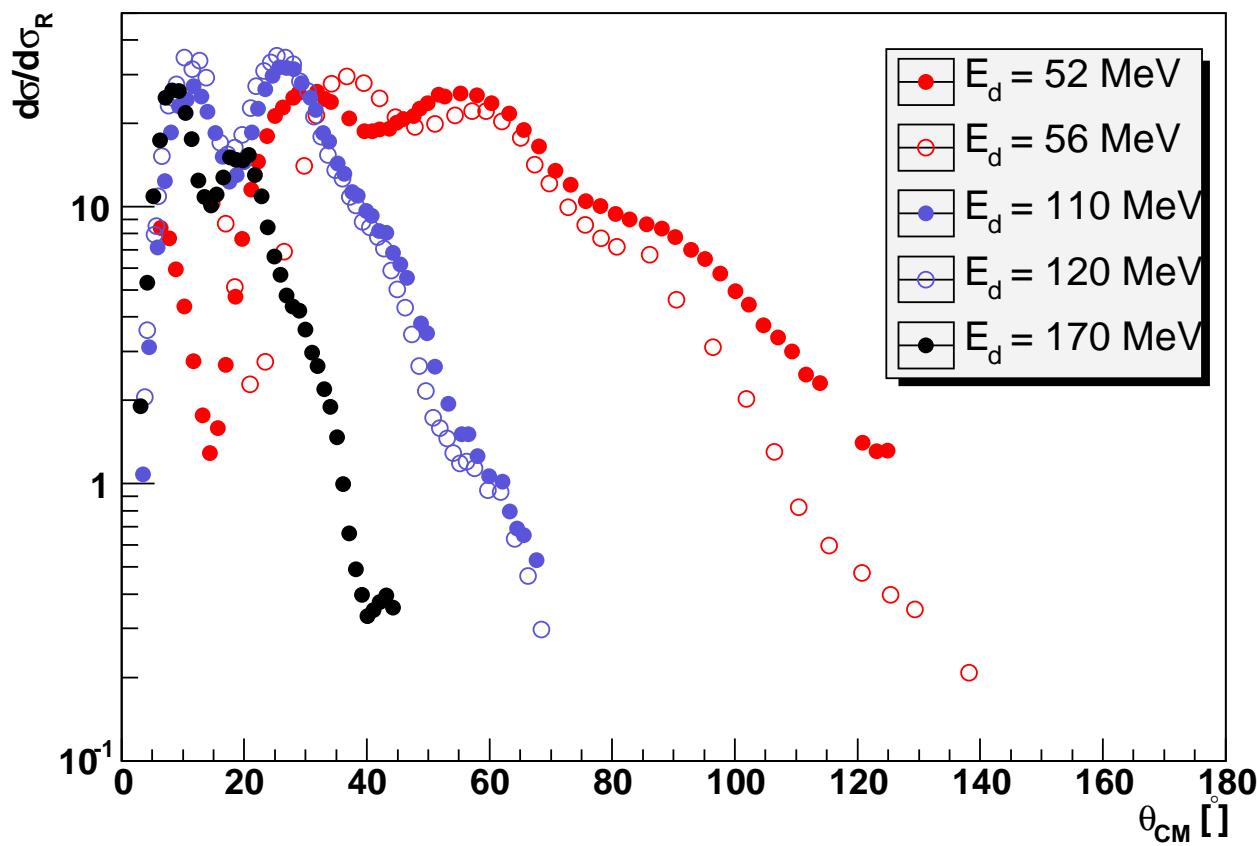


Polarimeter Issues

Performance of the polarimeter: need cross sections and analyzing powers for inclusive and exclusive cross sections with some precision vs scattering angle and energy/particle type. Plan: this can be done at KVI, using the IBP (but only marginally so). We need to prepare a measurement plan and time estimate.

Interaction of the polarimeter with the stored beam: this requires simulations (see previous point). Findings needs to be validated experimentally. Plan: this we can do at COSY, using a prototype polarimeter. It was suggested we submit a letter-of-intend to FZJ by March 15.

Polarimeter Issues



Polarimeter Issues

